

FOCUS

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy

November 2001

By the time peak demand periods approach next spring, both Parris Island and the Beaufort Air Station will have . . . the capability to orchestrate a major reduction in energy usage.

Marine Corps Uses Decision Support System to Manage Utilities

Marine Corps Recruit Depot, Parris Island is fast becoming the most energy-efficient base in the U.S. Marine Corps. Over the last few years, several FEMP-sponsored projects have been implemented at Parris Island to manage utilities, reduce energy consumption, and to allow better control over the base's cogeneration steam plant and building systems. The initial project at Parris Island, which is located in Beaufort, South Carolina, involved installing the Decision Support for Operations and Maintenance (DSOM II™) system in the base's central energy plant to aid in efficient generation of electricity and maintain peak demand below the penalty limit. The DSOM II™ system was developed by DOE's Pacific Northwest National Laboratory (PNNL).

PNNL's work at Parris Island has been focused in four areas:

- upgrading the central energy plant to the DSOM II™ system,
- upgrading the wastewater treatment plant Supervisory Control and Data Acquisition (SCADA) system with a DSOM II™-related technology,
- installing the DSOM II™ system in the remote Weapons Area Steam Plant, and
- installing a site-wide energy management and control system (EMCS) for major energy intensive buildings and barracks at Parris Island.

The results of the work are: more efficient use of natural resources, minimized electrical demand and environmental impact, and more effective distribution of limited manpower. These systems are tied into a common information management (DSOM II™, SCADA, and EMCS) system to allow centralized management over the entire Parris Island energy landscape. Information is available for operations, maintenance, engineering, training, and administrative users.

The DSOM II™ system provides electrical demand information to the EMCS in a load-shedding scheme that may lower peak demand by more than a megawatt. At a predetermined level of demand, after engaging the EMCS initial load-shedding scheme, the DSOM II™ system will indicate to central energy plant operators that they must generate

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The Director's Column

FEMP works to increase Federal access to utility resources and services including utility incentive programs. The positive investment trend in utility energy service contracts (UESC) continues to climb and in this issue we highlight how UESCs are a proven mechanism for improving Federal facilities.

Monitoring and managing Federal utility resources is a challenge being met by Defense Agencies with utility information management systems. We profile the Marine Corps Recruit Depot, Parris Island's approach to centralized utility management and Los Angeles Air Force Base's installation of submeters and automatic meter-reading software.

Please take advantage of FEMP's utility services and restructuring web site at www.eren.doe.gov/femp/utility.html. You can find information on changing energy markets and public benefits programs and as well as upcoming UESC training workshops and details on the Federal Utility Partnership Working Group.

Along with utility management projects, this issue reviews Energy Awareness Month activities. Many Federal agencies celebrated Energy Awareness Month this past October. DOE's theme "Conserve energy – Save Now or Pay Later" addressed recent power supply concerns and encouraged the Federal Government to increase its national energy supply through energy efficiency. Now more than ever before, it is time to foster energy security.

As a part of Energy Awareness Month, we honored the energy management successes and outstanding accomplishments of energy managers Government-wide. Please be sure to look for our Special Issue of the December *FEMP Focus* which will spotlight this year's recipients of the Federal Energy and Water Management Awards and the Presidential Awards for Leadership in Federal Energy Management.

– Beth Shearer
Director, Federal Energy Management Program

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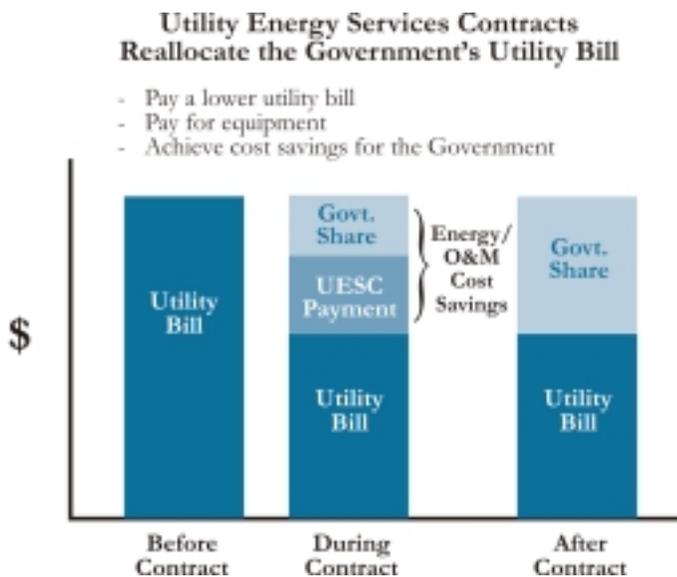
Retraction

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Utility-Financed Energy Productivity Investments Continue to Climb

The Energy Policy Act in 1992 encouraged Federal agencies to partner with utility companies and improve the energy and water productivity of their facilities. There has been substantial progress, but much more needs to be done. More than 60 electric and gas utilities have implemented efficiency and renewable energy projects and upgrades at Federal facilities, investing more than \$600 million through utility energy service contracts (UESCs). This positive trend is expected to continue.

Contracting officers have the clear authority to work with facility energy managers to reallocate the Government's utility bill. With UESCs, the bill can be divided into two parts: a less costly utility bill and the portion that would have otherwise paid for wasted electricity and gas. This portion pays the utility company for efficiency improvements. Once the term of the utility contract has been reached (typically 10 years), the energy and water savings benefit the agency and taxpayers (see chart below).



According to FEMP's UESC tracking, about 55 percent of the improvements from UESCs have been accomplished at Defense agency facilities, and the remainder in civilian facilities. Federal agencies have applied the utilities' investments in ten technology categories, listed below in descending order by expenditure:

- comprehensive upgrades,
- lighting and mechanical system upgrades,
- cogeneration,
- mechanical system upgrades,
- boilers/chillers retrofits,
- steam system upgrades and improvements,
- controls,
- energy and water combined projects, and
- heat pumps.

Along with lower commodity bills, the quiet success story of these investments has been the resulting increase in greater comfort and productivity.

FEMP encourages partnerships between agencies and utility companies to ease accessibility to UESCs. The trade organization for investor-owned utilities, the Edison Electric Institute, has committed to encouraging \$2 billion in investment by 2010 for life-cycle, cost-effective Federal facility improvement projects. In fiscal year 2000, \$146 million in private-sector investments will save \$32 million each year at Federal facilities. FEMP regularly brings the partners together under the auspices of the Federal Utility Partnership Working Group to share best practices and to promote more utility-financed projects. Membership in the Working Group requires nothing more than an interest to share and learn.

The FEMP web site at www.eren.doe.gov/femp/utility/utility_services.html provides information and resources to agencies seeking utility-financed energy efficiency solutions. Federal energy managers can also contact the Energy Efficiency and Renewable Energy (EERE) Clearinghouse at 800-363-EERE to request a free copy of a 15-minute UESC videotape that encourages agencies and utilities to build energy efficiency partnerships. Also available from the EERE Clearinghouse is *Utility Energy Services Contracts: Lesson Learned* regarding best practices on negotiating, financing, and lowering UESC finance rates, including competition between utility companies and best practices for water conservation.

UESCs are a proven mechanism for improving Federal facilities. A call to the Federal Accounts Representative at the serving utility company is the first step for a Federal facility manager to take. Agencies are also encouraged to contact their DOE Regional Office to discuss UESC opportunities. A DOE Regional map and contact information is contained in the FEMP web site at www.eren.doe.gov/femp/financing/femp_services_who.html.

For more information, please contact Brad Gustafson of FEMP at 202-586-5866 or brad.gustafson@ee.doe.gov or Morey Wolfson of NREL-FEMP at 303-384-7449 or morey_wolfson@nrel.gov.

Air Force Base Sees Energy Savings Take Off After Installing Submeters

Los Angeles Air Force Base (AFB) in downtown El Segundo, California, is a sprawling, 150-acre expanse of Government offices, research and development laboratories, military housing, and other facilities.

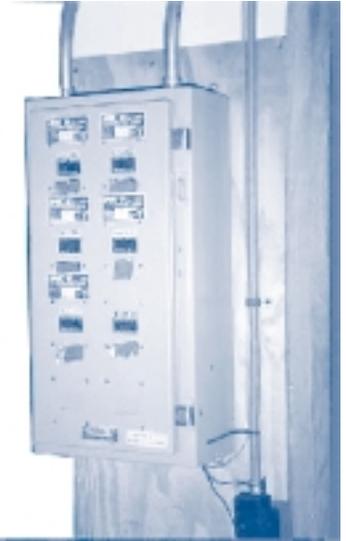
Accurate energy metering was an issue at the site where only one master utility meter measured energy usage for the entire Base. Energy Manager Ed Wilson, of the Base's Civil Engineering Department, explained, "We knew we were using a lot of energy and we were trying to determine where it was being used and at what time of day. But, we really had no idea which buildings were using more or less energy."

After evaluating several vendors, the Base selected E-MON Corporation's electrical submeters and automatic meter reading software. "I like the idea of stand-alone units capable of storing metering information and the battery backup," Wilson said. The project involved installation of 36 meters at the service entrances of 14 main buildings, totaling about 100,000 square feet. Collecting data from the submeters, communication interface units (or data accumulators) then relay the data to the energy manager's computer via modem. The data accumulators store information for up to 36 days in 15-minute increments or until downloaded to a computer, and the submeters can maintain data in case of a power interrupt.

The 61st Air Base Group People Center, housing services for Base personnel, illustrates the average size of the facilities now monitored by E-MON submeters.



A multiple meter unit may contain up to eight submeters and a communication interface device that downloads data from the meters and transmits it via modem to the energy manager's computer.



For Wilson, the payoff came surprisingly fast. Armed with hard data on energy loads and performance trends, he could pinpoint areas ripe for conservation measures and cost containment. "This is a great diagnostic tool and the perfect tool to use to demonstrate energy savings," Wilson pointed out. "People walk out of buildings at night and leave lights on, air conditioners on, and doors open. This occurs all over the Base. When you have a submetering system, you can see that a substantial amount of energy is wasted that way. He added, "Then you can talk to maintenance and other staff and show them how much more it costs us because we didn't do all we could to save energy. Running air conditioners at night in buildings of this size when they're unoccupied is a tremendous wasted cost, and with meters you can see this."

While the Civil Engineering Organization retains responsibility for paying Los Angeles AFB's electric bill, Wilson is now able to determine more accurately energy cost allocations for those organizations—tenants, partners, and customers—with funds for utility reimbursement. The more revenue he is able to generate from entities with these available reimbursement funds, the more resources his department has for Base repairs and maintenance, a secondary cost benefit of the submetering system.

Less than three years after the Base's submetering system was implemented, energy consumption decreased more than 27 percent from the established 1985 baseline. Utility costs decreased 23 percent from an established 1990 baseline—during a period in which electricity rates increased by 4.5 percent. In 1996, Wilson's leadership in initiating energy savings and raising energy conservation awareness among Base personnel won him the Air Force Materiel Command Energy Award. Overall, Los Angeles AFB is saving more than \$1 million annually on its utilities, and is likely to save more in California's tightening energy market.

For more information, please contact Ed Wilson of Los Angeles AFB at 310-363-0904 or eddie.wilson@losangeles.af.mil.

MARINE CORPS ATTACKS ENERGY MANAGEMENT HEAD-ON

(continued from page 1)

electricity in guided stages up to maximum generation capacity. At that point, if necessary, the EMCS load-shedding scheme shuts down equipment to prevent exceeding the peak demand limit. The first buildings under this EMCS load-shedding scheme went on-line in June 2001 and the program has resulted in preliminary electricity savings valued at \$23,000 and lowered the peak demand for the month from 9.2 to 8.3 megawatts. As additional buildings come on-line throughout the rest of this year, significant savings are expected to be realized.

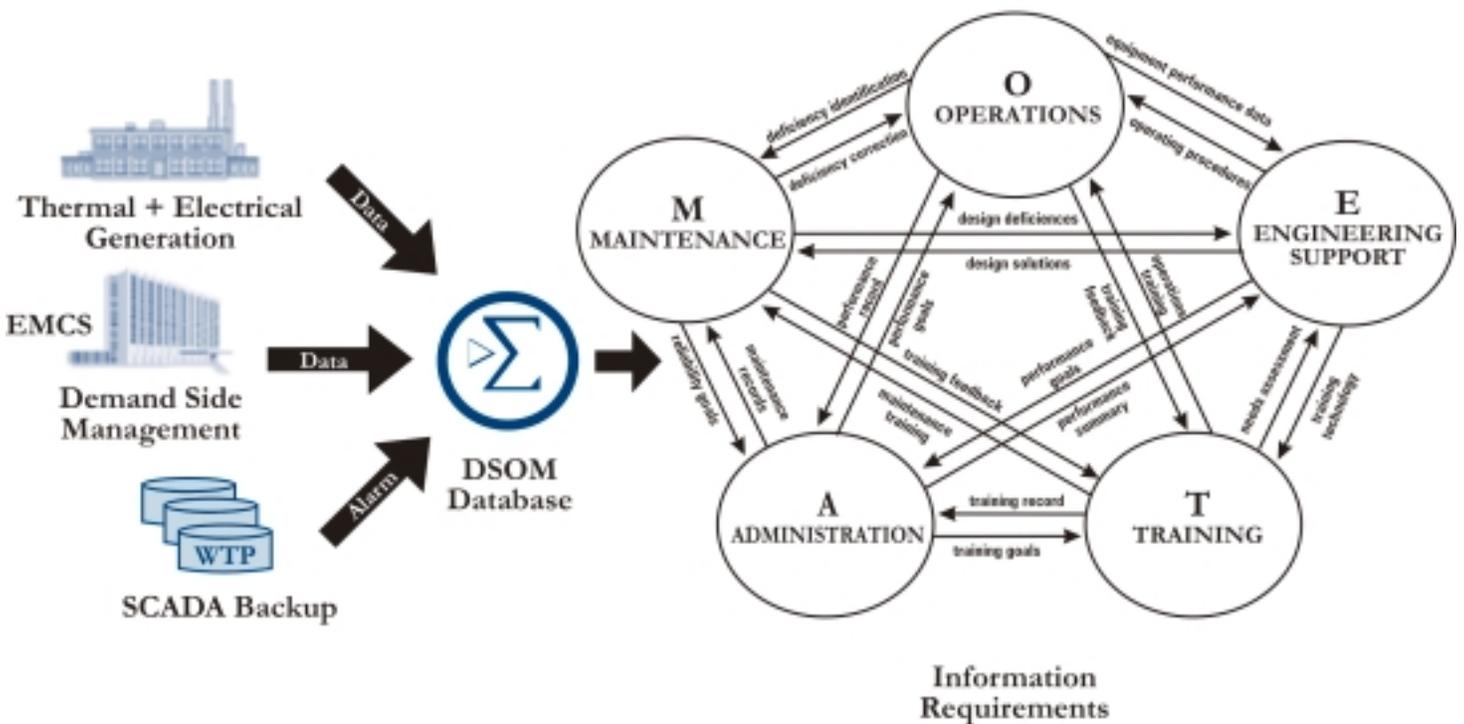
A similar EMCS upgrade program is in progress at Marine Corps Air Station Beaufort, South Carolina. By the time peak

demand periods approach next spring, both Parris Island and the Beaufort Air Station will have a significant number of buildings on-line, and the capability to orchestrate a major reduction in energy usage.

The initiative demonstrated by energy management staff at Parris Island and Beaufort Air Station prevails throughout the Marine Corps. Marine Corps recipients in Parris Island were recently honored as leaders in energy conservation by the Secretary of the Navy and Marine Corps recipients in Arizona and Japan were recently honored with Exceptional Service and Director's Awards at the Federal Energy and Water Management Awards.

For more information, please contact Brad Gustafson of FEMP at 202-586-5866 or brad.gustafson@ee.doe.gov or Richard J. Meador of PNNL at 509-372-4098 or richard.meador@pnl.gov.

Parris Island Facilities Integration Model



Parris Island's information management system allows centralized management over the entire Parris Island energy landscape with targeted information available to operations, maintenance, engineering, training, and administrative users. This model has proven its applicability to other Marine Corps Installations.

Oakland Operations Office Celebrates Seventh Annual "DOE Day"

DOE's National Nuclear Security Administration's (NNSA's), Oakland Operations Office hosted its seventh annual "DOE Day" on October 4, 2001 with approximately 2,000 citizens joining energy experts from DOE, its National Laboratories, and other Federal agencies. Participants learned about energy conservation efforts that can be used at home and at work.

In celebration of the DOE Day theme, "Think Conservation – Use Energy and Resources Wisely," representatives from DOE's Energy Information Center/Public Reading Room set the tone of the event by greeting the public at both entrances to the exhibition area. DOE Day programs, energy conservation brochures, including the award-winning booklet *Energy Savers Tips on Saving Energy and Money at Home*, and DOE/NNSA souvenir plastic bags were handed out. Information was also provided on how Oakland Operations Office is incorporating key changes into everyday activities at DOE sites including eliminating the use of radioactive materials, composting yard waste, recycling valuable materials within the community, retrofitting lighting to be more energy-efficient, and replacing fleet vehicles with less-polluting models.

An attention-grabbing exhibit on U.S. energy flow and carbon emissions, complete with charts showing how these resources were distributed among end-use sectors (residential, commercial, industrial, and transportation), was a popular stop for several visitors. A favorite among the school children, the interactive *Fun with Science* demonstration, explained science while stressing the importance of reading, science, mathematics, and technology. Kids of all ages took a ride on Lawrence Livermore National Laboratory's Energy Bike to find out how much power they could generate in 30 seconds and got a glimpse of the future with a display of the energy world.

Lawrence Berkeley National Laboratory (LBNL) impressed the crowd with its new energy efficient "Berkeley Lamp" and other energy-efficient technologies developed at LBNL to help consumers reduce energy bills at home and at work. LBNL researchers were also on hand to answer energy conservation questions and provide the public with practical ways to reduce energy use with information on the Lab's "20% Solution" web site. The site identifies energy-efficiency measures and their

Marty Domagala, Deputy Manager for DOE's Oakland/NNSA Office, takes a spin on the "Energy Bike" at OAK's 7th annual DOE Day, as Jill Dees from LLNL provides encouragement.



predicted percentage savings to consumers. This web site played a substantial role in helping consumers reduce their home energy demands by as much as 20 percent during the California's recent energy crisis.

Scientists representing the Combustion Research Facility at California's Sandia National Laboratory displayed samples of alternative fuels, a model research engine, and technologies developed to improve combustion efficiency and reduce pollutants. The public was given the opportunity to see the end results of this type of technology, compliments of the General Services Administration and Pacific Gas & Electric, who showcased ten alternative fuels vehicles and distributed brochures explaining their environment friendly features.

The event was co-sponsored by the General Services Administration and the Environmental Protection Agency (EPA). EPA exhibited information on the EPA/DOE ENERGY STAR® program, as well as cooperative efforts in pollution prevention.

In addition, DOE Day's participating organizations included:

- Lawrence Livermore National Laboratory,
- Lawrence Berkeley National Laboratory,
- Stanford Linear Accelerator Center,
- Sandia National Laboratory (California),
- University of California,
- Pacific Gas & Electric,
- California Energy Commission,
- Bay Area Quality Management District,
- and more than half-a-dozen other organizations.

For more information, please contact Tom Brand of DOE's Oakland Operations Office at 510-637-1696 or tom.brand@oak.doe.gov.

Secretary of the Navy Honors Energy Conservation Achievers

Eight Navy and Marine Corps organizations were named in October as leaders in energy conservation for FY 2000. The eight were honored by the Secretary of Navy with awards on October 18, 2001 at the U.S. Naval Memorial, in Washington, D.C. Scores of winners and dignitaries attended, including keynote speaker H.T. Johnson, Assistant Secretary of the Navy for Installations and Energy.

The awards followed the presentation of Federal Energy and Water Management Awards to outstanding Federal energy and water conservation programs Government-wide. This year the Department of Navy activities garnered 13 awards made to Federal entities worldwide.

The Secretary of Navy winners were chosen from a field of nominees representing ships, squadrons, bases, and other Navy facilities that achieved impressive energy savings in FY 2000.

“The quality of these programs is emblematic of the leadership ability of the Navy and Marine Corps,” said Duncan Holaday, Department of Navy Deputy Assistant Secretary (Installations and Facilities). We are proud of the job our energy managers continue to do on behalf of the Department, taxpayers, Congress, and the Commander-in-Chief.”

Department of Navy winners and their programs:

Naval Sea Systems Command (NAVSEA) Naval Surface Warfare Center (NSWC) Crane, Indiana

Division – Through a combination of programs, NSWC Crane last year reduced its energy consumption by more than 8 percent. Its \$2.8 million in energy projects save about \$641,000 per year, reduce energy consumption by almost 28 billion Btu per year, and save almost 108 billion gallons of water per year.

Naval Security Group Activity (NSGA) Sugar Grove, West Virginia

– NSGA Sugar Grove reduced its energy consumption 22 percent in FY 2000. It upgraded lighting systems throughout the Command, including indoor fluorescent fixtures, compact fluorescent lighting, and outdoor high-pressure sodium lighting. Occupancy-sensing light-switches were installed and maintenance and electricity demand were reduced saving the base \$32,000 per year.

Marine Corps Recruit Depot Parris Island, South Carolina

– Parris Island reduced its energy consumption 22.7 percent compared to the 1985 baseline. The Depot implemented a program called “Cheaper by the Dozen,” a portfolio of a dozen ongoing conservation projects marked by short payback, substantial energy savings, or potential for direct cost avoidance.

Marine Corps Air Station Iwakuni, Japan

– Marine Corps Small Shore Activity Iwakuni revised its Station Energy Order, established a strong energy conservation planning group and an energy monitor program, resulting in 7.6 percent less energy consumed per square foot and \$1.2 million in avoided annual electricity costs. They renegotiated their electric rate structure, implemented a peak shaving program, and initiated a successful, detailed building energy audit program.

USS BOXER (LHD-4) – USS Boxer reduced its fuel consumption by nearly 630,000 gallons in FY 2000 compared to 1995, saving more than \$372,000. USS Boxer consumed only 54 percent of its allotted fuel through its dedication to fuel conservation. Three engineering plant configurations were designed to optimize fuel efficiency based on operational requirements and transit speeds.

USS Taylor (FFG-50) – USS Taylor reduced its fuel consumption in FY 2000 by more than 168,000 gallons saving \$107,000. Projected savings through 2010 total \$2.5 million. The ship closely coordinated conservation-oriented activities between the navigation and engineering departments to devise the most fuel and cost-effective transits.

Fleet Logistics Support Squadron Fifty-Seven (VR-57)

– Careful planning, heightened awareness, and dedicated commitment to effective energy management and conservation resulted in savings of more than \$830,000 in energy costs in FY 2000, and 23 percent lower fuel consumption than in 1995.

NAVSEA Naval Undersea Warfare Center (NUWC) Division Keyport, Washington

– NUWC Keyport reduced its energy consumption 8.7 percent in FY 2000, a 30 percent reduction compared to 1985 levels. Keyport initiated a host of programs in FY 2000 including spot market natural gas contracting through the Defense Energy Support Center, saving \$48,000 in the course of the fiscal year.

For more information, please contact Mark Bellis of the Office of the Assistant Secretary of the Navy at 703-588-6685 or bellis.mark@navy.mil.

NADC Kick-Off Event Showcases Energy Savings Project

Federal, State and local officials gathered to mark the launch of a comprehensive energy savings program at the U.S. Department of Agriculture's (USDA's), National Animal Disease Center (NADC) in Ames, Iowa.

The project, undertaken in response to Presidential energy-reduction directives, is the biggest of its kind within USDA and the first for the USDA's Agriculture Research Service. It involves several innovative strategies, including a cogeneration unit displayed during the event. The goal of the project is to reduce energy costs by 30 percent in NADC's 80 buildings, saving an average of \$550,000 per year for the next 17 years.

NADC, USDA's largest animal disease center, is working with DOE and Milwaukee-based Johnson Controls, Inc. through an energy savings performance contract (ESPC). Under the 17-year contract, Johnson Controls has audited NADC's buildings, developed a comprehensive plan, coordinated the project's funding, and guaranteed the results. Johnson Controls has also

been working with Alliant Energy, the local utility, and other firms on the project. Project administration is provided through DOE's Federal Energy Management Program, which awarded the indefinite-delivery, indefinite-quantity ESPC under which this delivery order was issued.

Mindful of NADC's multi-year Modernization Plan, project managers took into account the planned demolition of several support buildings over the next decade as they determined short-term facility energy considerations, such as lighting and heat recovery systems in existing buildings, and longer-term payback items including chillers and a utility rate review.

Perhaps most noteworthy is the cogeneration power unit. This natural gas-driven combustion turbine generates 1.5 megawatts of electricity, then uses the heat from the combustion process to generate steam through a boiler system. NADC is able to produce electricity for half of the current utility rate, and the steam is essentially a free byproduct used to run incinerators and sterilizers and generate hot water for heat in the winter. The installation of the cogeneration system allows NADC to purchase electricity and gas on interruptible rates, thus reducing the overall cost of utilities.

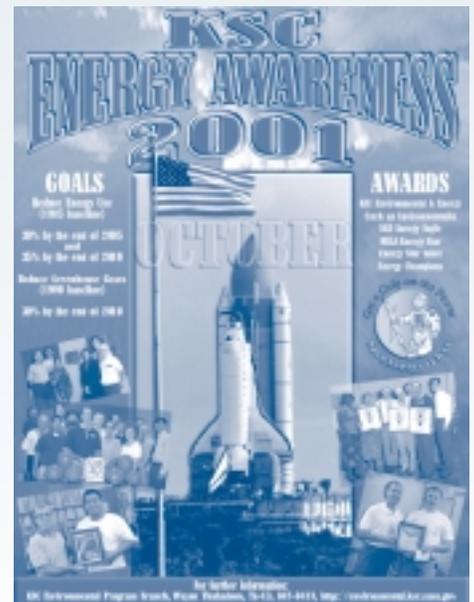
For more information, please contact Dennis Jones at 515-663-7217 or djones@nadc.ars.usda.gov or Jerry Cook of Johnson Controls at 515-252-0100 or jerry.p.cook@jci.com.

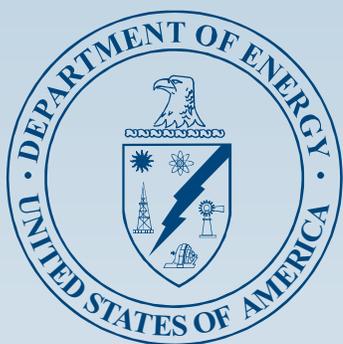
HHS Promotes Energy Awareness Month

In celebration of Energy Awareness Month, the Department of Health and Human Services (HHS) exhibited an energy awareness display in the Great Hall of the Hubert H. Humphrey Building in Washington, D.C. The display highlighted the agency's Energy Champions, showcase projects, the *You Have the Power Campaign*, and provided information on how employees can save energy and water at work and at home. The Humphrey Building, HHS Headquarters, is a model for other HHS facilities in raising employee energy awareness. Facility management also performs annual night-time energy audits in conjunction with Energy Awareness Month to determine the percentage of employees who are turning off lights and office equipment. Auditors leave reminder tickets when equipment is found on or "award" notices when all appliances are turned off. Handouts from the *You Have the Power Campaign* are also distributed. Each year the number of employees who leave equipment on has decreased significantly. Because of the success of the audits, HHS has expanded the program throughout the agency.

For more information, please contact Scott Waldman of HHS at 202-619-0719 or scott.waldman@hhs.gov.

NASA Kennedy Space Center's Energy Awareness Month Poster





DOE Marks 22 Years of Energy Management Success

DOE Celebrated 22 years of energy efficiency recognition through its annual Departmental Energy Management Awards Ceremony on October 16, 2001. The awards were established in 1979 by the In-House Energy Management Program of the Department, which is part of the Federal Energy Management Program under the Assistant Secretary for Energy Efficiency and Renewable Energy. Each year, these awards are presented to DOE personnel in recognition of their outstanding contributions toward energy and dollar savings at DOE facilities and field organizations. The 22nd Annual Departmental Energy Management Awards honored organizations, individual, small groups, and DOE energy champions. The efforts of the Department Energy Management Award winners in implementing cost-effective operational improvements and energy-efficient retrofit projects for DOE buildings and facilities have contributed significantly to the success in meeting Federal energy reduction mandates. The 2001 Departmental Energy Management Award Winners are as follows:

Organizations

Pacific Northwest National Laboratory, Energy Conservation Campaign
Mike Moran

Fermilab, Utility Incentive Program
John Chapman
Steve Dixon
Emil Huedem
Bob Huite
Steve Krstulovich
David Nevin
Randy Ortgiesen
Ted Thorson

Outstanding Individual Efforts

Lawrence Berkeley National Laboratory
Steve Greenberg

Small Groups

Lawrence Livermore National Laboratory, Emergency Electric Load Curtailment Plan
Segundo Cardeno
Mark Cardoza
Partha Chakravarthy
Meredith Erickson
Michael Minard

Lawrence Livermore National Laboratory, Building 482 Lighting Retrofit
Thomas Boock
Thomas Coward
Blair Horst
Charles Klein
Ronald Price

Lawrence Berkeley National Laboratory, Sitewide Water Efficiency Retrofits in Restrooms
Patrick Aki
Larry Davis
Scot Harvest
Maurice Holeman
Thomas Reese

Savannah River Operations Office, Savannah River Site ESPC Task One
Patrick Burke
Howard Dickinson
Donell Jenkins
David Wolfe

Sandia National Laboratories, Chilled Water Thermal Energy Storage System
John Garcia
Carl Peterson
Mike Rymarz
Jerry Savage
Ralph Wrons

Fermilab, CHL Liquid Nitrogen Recovery Retrofit
Jerry Makara
Barry Norris
Bill Soyars
Jay Theilacker
Ron Walker

Energy Champions

U.S. Department of Energy
Michael Shincovich

Idaho National Engineering and Environmental Laboratory Compressed Natural Gas Fueling Station

For detailed information on the Department Awards, please see FEMP's web site at www.eren.doe.gov/femp/aboutfemp/2001_winners.html. For more information on the DOE Departmental Energy Management Awards, please contact Danette Delmastro of FEMP at 202-586-7632 or danette.delmastro@ee.doe.gov.

Second Edition of Greening Federal Facilities Now Available

An updated and expanded second edition of *Greening Federal Facilities: An Energy, Environmental, and Economic Resource Guide for Federal Facility Managers and Designers* is now available in PDF format on the FEMP web site at www.eren.doe.gov/femp/techassist/green_fed_facilities.html. A limited number of printed copies are also available through the Energy Efficiency and Renewable Energy Clearinghouse at 800-363-EREC.

This comprehensive resource guide to sustainability in Federal facilities highlights practical actions that can be implemented in ongoing operations and new construction, and through retrofits—actions that save energy, water, and money, improve the productivity and comfort of building occupants, and benefit the environment. The guide is intended for Federal facility and energy managers, designers, planners, construction staff, and others interested in low-energy, sustainable Federal buildings. The second edition now includes a section on design

of new buildings and retrofits and significantly updates other important topics such as:

- site and landscaping issues;
- sustainable building design;
- energy-efficient lighting, heating, and cooling;
- efficient appliances, motors, and electric power systems;
- water and wastewater issues;
- materials selection, waste management, and recycling; and indoor air quality.

Greening Federal Facilities reflects a long-standing commitment to make Government work better and cost less, to use the Federal Government's purchasing power to stimulate markets for U.S. energy and environmental technologies, and to save taxpayers money by reducing the cost of materials, waste disposal, and energy.

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Naval Facilities Critical Power Program

The Naval Facilities Critical Power Program is designed to provide worldwide turnkey support to Government installations (of any civilian or military agency) needing assistance in procurement, installation, repair/replacement, and maintenance of critical power systems. The program is managed by the Naval Facilities Engineering Service Center (NFESC) Detachment at the Washington Navy Yard, Washington, D.C.

The Center's expertise includes:

- uninterruptible power supply systems,
- battery systems and chargers,
- power distribution units and surge protection of transient voltage suppression system equipment,
- motor controllers and control systems,
- power generation systems,

- switchgear,
- line conditioners,
- inverters,
- transfer switches,
- load banks,
- transformers,
- voltage regulators, and
- HVAC in support of these systems.

This program includes a multiple-awarded, competitively-bid, indefinite-delivery, indefinite-quantity, multi-year contract. Awards were made to A-TEK, Inc; Chevron Energy Solutions, L.P.; Powerware Corporation; and Sea Tech of the Florida Keys, Inc.

For more information, please contact Peter Fanning of the Naval Facilities Engineering Service Center at 805-982-3564 or fanningpk@nfesc.navy.mil.

Teams Still on ALERT for Energy Efficiency, Reliability, and Security



This year, the Assessment of Load and Energy Reduction Techniques (ALERT) Teams that were deployed by FEMP helped Federal agencies in California reduce their energy demand and consumption, in areas where prices were volatile and electricity was in short supply.

Eight teams assessed 25 California sites between May 3 and July 31, 2001. Each team developed strategies for potentially rapid and low-cost (or no-cost) implementation of energy efficiency measures at the Federal sites. In preparation for the site visits, teams were identified, preliminary information was obtained from the sites, and assessment, reporting, and tracking protocols were developed.

Preliminary results indicate that implementing the recommended energy-saving measures identified during the assessments would reduce electricity demand by up to 17.6 kilowatts, reduce consumption by 74,000 megawatthours, and lower energy costs by over \$13 million. The total reductions from pre-assessment levels are approximately 10.5 percent for demand, 2.3 percent for consumption, and 8.4 percent for costs.

Some hallmarks of the ALERT Teams in FY 2001 were the fast response and thorough follow-up at sites after the initial assessments were conducted. When possible the ALERT Teams worked with staff at individual sites to implement the energy-reduction measures during the site assessment. They also conducted a limited assessment of opportunities for

distributed generation and for capital-intensive energy efficiency projects.

On August 30, FEMP also sponsored a workshop and a live Webcast at one of the participating sites, the Presidio of San Francisco, to brief Federal agencies and other interested parties on lessons learned during the ALERT assessments. The workshop drew 66 participants from a variety of Federal agencies, and the Webcast attracted 1,600 viewers from Federal agencies and private-sector energy service providers nationwide.

Since then, recent events have sharpened our focus on energy security and vulnerability issues. The focus on peak load reductions remains a factor in areas with transmission constraints. Containment of energy costs continues to be a high priority, as repercussions from the recent spate of rate increases impact energy budgets. Volatility in natural gas prices demonstrates the need to improve operational efficiencies to minimize natural gas consumption and dependence, particularly in areas subject to pipeline constraints and resulting price excursions.

As a result of these factors ALERT activities in FY 2002 will focus on:

1. Reducing peak electrical loads and consumption and reducing on-site fuel consumption for cost containment,
2. Performing peak load management,
3. Assessing on-site generation to reduce energy vulnerability and enhance mission reliability,
4. Identifying public benefits funding and alternative tariffs and assisting with the application process, and

5. Identifying other FEMP support services desired by Federal sites.

The ALERT Teams will work with site personnel to develop a strategic implementation plan to address agencies' urgent needs to manage price volatility, reduce the impacts of escalating energy rates, and address reliability and vulnerability issues. A strong emphasis will be placed on operations and maintenance strategies that result in lower energy costs and reduced vulnerability.

FEMP services are also available to Federal sites to assist them in implementing more capital-intensive measures in addition to the no-cost and low-cost measures identified by the ALERT Teams. The intent of the ALERT program is to facilitate the transition from an ALERT assessment to other services, such as project financing support and technical assistance, and to enable the agencies to accomplish their energy efficiency, renewable energy, and energy security objectives.

FY 2002 ALERT activities will include 30 to 40 site assessments and an ALERT workshop in the spring to share information and results with Federal agencies and private-sector service providers. Sites will be selected on the basis of the potential impact of the assessment and their cost-sharing ability. If you are interested in a site assessment or in attending the workshop, please contact your DOE Regional Office FEMP Representative (see www.eren.doe.gov/femp/aboutfemp/fempcontacts.html).

For more information, please contact Brad Gustafson of FEMP at 202-586-5865 or brad.gustafson@ee.doe.gov.

NEW TECHNOLOGY DEMONSTRATION PROGRAM

The Role of New Technologies

This is the first in a series of articles from the FEMP New Technology Demonstration Program.

There are many strategies that can be used to reduce energy consumption and costs. These strategies might include:

- awareness programs,
- operations and maintenance programs,
- training programs,
- efficient equipment procurement programs,
- energy commodity procurement programs, and
- energy-efficient emerging technology programs.

An effective energy management program will likely use many, if not all, of these strategies. This article will concentrate on the role of new and emerging energy-efficient technologies.

Removing old, inefficient equipment and replacing it with newer, more energy-efficient equipment is a very common method of reducing a site's energy consumption—and costs. In fact, some energy management programs are based almost exclusively on this type of activity. Two questions that get asked include: “which” energy-efficient technology should I select? And just as important is, from “what list of alternatives” should I select?

The answer to the first question should be, “I should select the most life-cycle cost-effective alternative.” After all, that's what is mandated by 10 CFR 436.⁽¹⁾ The answer to the second question may be more difficult. If you don't put a new technology on the list of alternatives, it can never be selected.

One issue may deal with new and emerging technologies and the issue of risk and reliability. When something is new, it is perceived to have more risk. *“It claims to be more energy efficient but I've not seen one in operation before. Will it work here? Will it work in this application? Is my maintenance team ready to work with this new technology?”* These are all important, and relevant, questions.

The time it takes for a “new” technology to become accepted to the point of being considered a “conventional” technology can be surprising. Take, for example, the fluorescent T-8 lamp and electronic ballast. Is this what you consider new, energy-efficient lighting technology? Did you know this technology is 30-years old? Granted, most designers today accept this technology as “conventional” for standard office lighting configurations. Now, think of the energy savings that could have been realized by the Federal sector (or even by your specific agency) if this technology could have been fully introduced into market in only 5 to 10 years instead of 20 to 30 years? Don't limit your thinking to lighting technology, the same is true for any energy-using equipment: cooling, heating, ventilation, battery chargers, water heaters, and the list goes on.

Of course, balanced against the potential energy reduction is the potential for risk. The way you manage the risk, or at least to better understand the risk, is to evaluate the new technology on a limited basis before it is mass deployed. This is the purpose of demonstrations, pilot projects, and case studies. With these options, you can look before you leap, and in some cases, learn from the mistakes of others. This is the reason for FEMP's New Technology Demonstration Program.

The New Technology Demonstration Program was established in 1990 to fulfill three goals:

- Reduce Federal-sector costs and improve overall energy efficiency;
- Accelerate Federal adoption of new and emerging energy-efficient technologies, including water-conservation, solar and other renewable-energy technologies, and improve the rate of technology transfer; and
- Help Federal facilities implement pollution prevention strategies and reduce operations and maintenance costs.

These goals are reinforced by the Energy Policy Act of 1992 and subsequent Executive Orders. The New Technology Demonstration Program accomplishes its goals by conducting technology evaluations and sharing the results with Federal

⁽¹⁾ U.S. Code of Federal Regulations, Chapter 10, Part 436.

THE ROLE OF NEW TECHNOLOGIES

continued from previous page

energy managers, facility managers, procurement specialists, contracting officials, and others involved in specifying, buying, operating, or maintaining energy- and water-management technologies.

The FEMP-sponsored technology evaluations vary according to the maturity of the technology and the availability of reliable technical information from nonpartisan organizations. A metered demonstration by the New Technology Demonstration Program may be required for technologies that are emerging and where little is known about predictive performance under various operating conditions. For other technologies, where performance is better understood but that have not been fully embraced by the Federal sector, the New Technology Demonstration Program has other publications, including the *Federal Technology Alert*, *Technology Installation Review*, and *Technology Focus*.

The purpose of New Technology Demonstration Program publications is to inform FEMP's customers and to provide accurate, up-to-date information on new technologies. New Technology Demonstration Program publications do not constitute FEMP endorsements; rather they provide information so that readers can make educated judgments on whether the subject technologies are suitable for their Federal sites.

You can learn more about each of the New Technology Demonstration Program publication series from the FEMP web site at www.eren.doe.gov/femp/; just click on "Products, Technologies, and Success Stories" and follow the path to the New Technology Demonstration Program. To assist you in locating current publications on new technologies investigated by the Program, see the *Technology Index* listed on the main New Technology Demonstration Program web page.

The next article of this series will present a success story from the files of the New Technology Demonstration Program. Read how one Federal site began with a little information and a lot of drive, which resulted in several energy improvement projects.

For more information, please contact Ted Collins of FEMP at 202-586-8017 or theodore.collins@ee.doe.gov or Steven Parker of PNNL at steven.parker@pnl.gov.

New Federal Technology Alert on Ground Source Heat Power Available

FEMP's New Technology Demonstration Program recently released a *Federal Technology Alert* on ground-source heat pump technology. Developed by the Pacific Northwest National Laboratory, this *Federal Technology Alert*, "Ground Source Heat Pumps Applied to Federal Facilities—Second Edition," describes how ground source heat pump technology can be an energy-efficient and cost-effective way to heat and cool Federal facilities. It identifies several different types of ground-source heat pump systems, each with unique advantages and limitations. The document, an update of an FTA originally published in 1995, also outlines how to estimate potential costs and savings associated with ground-source heat pump systems applied to Federal facilities.

While the ground-source heat pump technology has been in use for several decades, it is only now becoming common practice in the Federal sector. In addition to significantly reducing heating and cooling costs, the technology can also reduce operations and maintenance requirements. New software tools are now available to assist designers, and DOE has established a nationwide Super Energy Savings Performance Contract to assist Federal agencies with funding the installation of this and other energy-saving measures.

Federal Technology Alerts provide summary information on energy-efficient, water conserving, and renewable-energy technologies that may have the potential to further reduce operating costs of Federal facilities. The technologies featured in *Federal Technology Alerts* have already entered the market but are not in general use in the Federal sector.

A complete description of FEMP's New Technology Demonstration Program and its products (including this *Federal Technology Alert*) can be found on the FEMP web site at www.eren.doe.gov/femp/prodtech/newtechdemo.html. You may also order any NTDP product through the FEMP web site, just click on "order FEMP materials" located in the banner of any FEMP web page. Of course, you may also order any FEMP product, including NTDP products, by calling the Energy Efficiency and Renewable Energy Clearinghouse at 800-363-EREC [international callers, please use 703-287-8391].

For more information on the New Technology Demonstration Program, please contact Ted Collins of FEMP, at theodore.collins@ee.doe.gov; Steven Parker of PNNL at steven.parker@pnl.gov; or David Payson of PNNL at dave.payson@pnl.gov.

Berkeley Lab Scientists Develop Energy-Efficient Alternative for Home and Office Lighting

A new high-performance, energy-efficient table lamp recently developed at Lawrence Berkeley National Laboratory (LBNL) and manufactured by Light Corporation shows great promise for lowering electricity use in hotels, homes, and offices. Tests have steadily demonstrated significant energy savings, a noticeable improvement in lighting quality, and a uniformly high degree of user satisfaction.



Features of the lamp include two fully-dimmable and independently-controlled 55-watt compact fluorescent light (CFL) bulbs. Located between the CFLs is an optical septum (membrane) that allows the user to operate the lamp three different ways:

- the CFL below the septum can be turned on for downward lighting,
- the CFL above the septum can be turned on for indirect room lighting, and
- both CFLs can be turned on together for up and downward lighting.



LBNL's High Performance Table Lamps.

This flexibility is not the only unique aspect of the lamp's design. High light output, even light distribution, and elimination of computer screen glare are other impressive characteristics.

The new lamp's luminous output at full power is equivalent to a 300-watt halogen torchiere and a 150-watt incandescent table lamp combined, yet the lamp uses only 25 percent of their power. Ongoing studies monitoring energy use of lamps at several LBNL offices show energy savings varying from 40 to 70 percent. These savings are dependent, of course, upon existing lighting systems and how individual users control the lamp.

Three of California's largest electric utilities (Southern California Edison, Pacific Gas and Electric Company, and the Sacramento Municipal Utility District) have enthusiastically embraced the prototype lamp. These utilities and LBNL have purchased almost 1,000 lamps as they have come off the production line. The utilities are deploying the lamps in hotels and offices as part of a demonstration program monitoring energy use and customer satisfaction.

"For LBNL, this new table lamp represents one of the few remaining opportunities we have to lower our power consumption," said Doug Lockhart, Section Chief of Mechanical Engineering and In-House Energy Management. "Major retrofits affecting lighting, heating, air conditioning, and electrical equipment have already been implemented," added Lockhart.

Satisfaction with the over 300 lamps already distributed at LBNL has been high. Michael Siminovitch, one of the developers of the lamp and a scientist in LBNL's Environmental Energy Technologies Division, credits the lamp's popularity to the focus his group put on lighting quality. "We spent a lot of time studying the optics," stated Siminovitch. Another developer of the lamp, Erik Page, added, "The lamp has been specifically designed to give off a significant amount of light in a soft, even, and glare-free manner."

Eventually, LBNL hopes to have the new table lamps placed in offices site-wide, while the utilities plan to pave the way for widespread use of this lamp throughout the State of California. According to Siminovitch, market saturation statewide "could greatly reduce power consumption in California while increasing the quality of the lighting environment."

For more information on the Berkeley Lamp visit <http://lighting.lbl.gov/projects/table/table.html> or for ordering information, go to: www.lightcorp.com/berkeley.htm. For additional information, please contact Michael Siminovitch of LBL at 510-486-5863 or MJSiminovitch@lbl.gov; or Erik Page of LBL at 510-486-6435 or ERPage@lbl.gov.

Super ESPC Best Practices

Fine-Tuning for Best-Value Super ESPCs Using the Risk/Responsibility Matrix

At the heart of a performance contract is a guarantee of a specified level of cost savings and performance. The customer is not obligated to pay for an unmet guarantee. The question is, what exactly is being guaranteed? Who is responsible for factors that affect performance and savings? And who pays for what?

To structure best-value Super Energy Savings Performance Contract (ESPC) deals, agency decision-makers can custom-tailor a deal to suit their site's particular needs and circumstances. Super ESPCs leave broad latitude for the agency to negotiate a deal that uses the agency's resources effectively, makes good business sense, and yields optimum value.

The Risk/Responsibility Matrix in the newly amended Super ESPCs provides a process for thinking through the options and allocating responsibilities between the energy service company (ESCO) and the agency—who does what and who pays for what during the contract term. (The matrix is posted under “Phase 3” at www.eren.doe.gov/femp/financing/espc/implementing.html.) Early in the project development process, the ESCO and the agency review the matrix together and evaluate how to allocate these responsibilities, taking into consideration the agency's resources and preferences.

A few fundamental principles can be applied:

- The party with the greatest ability to cost-effectively manage a responsibility should be financially responsible for doing so,
- The party bearing a responsibility should have an opportunity to be compensated, and
- The party that creates a cost should bear that cost.

The responsibility matrix addresses three categories of responsibilities or factors at work in the contract—operational, performance related, and financial. Some of the considerations in each category are discussed briefly below.

Operational Considerations

In Super ESPC delivery orders, savings are calculated in relation to a baseline that represents the energy cost that would have occurred if the status quo had been maintained and no new

energy conservation measures (ECMs) had been installed. The agency and the ESCO agree on the baseline (or how the baseline will be determined) and how cost savings will be calculated and compared to the guarantee for verification. The guarantee and the method for verifying savings must be documented in the contract in a way that accounts for potential impacts of operational factors.

Over the term of the contract, if building occupants acquire no new electrical equipment that significantly increases plug load, if the weather is not extreme, and if operating hours remain the same, the ESCO's estimates of energy savings will likely prove accurate and the guarantee will be met. However, if extreme weather occurs, if occupants increase the number of computers or other office equipment in use, or if a plant adds a second shift, energy usage will increase and savings may appear smaller than expected.

Who is responsible for this increase in energy use under the contract? The agency, as the party with the greatest ability to cost-effectively control operational factors, generally takes financial responsibility. Even when the project does not totally eliminate potential cost increases from operational factors, the new ECMs will minimize cost increases and make them more manageable than before.

Operating Hours and Load. The agency generally assumes financial responsibility for operating hours and load in one of two ways:

Baseline Adjustments. The contract can allow specified baseline adjustments for changes in operational factors so that savings calculated in relation to the higher baseline will better reflect the savings attributable to the new ECMs. Baseline adjustments must be supported by measurements.

Stipulation. Both parties can accept stipulated operational factors and estimated savings based on engineering calculations and measurements as a fair representation of savings. If related requirements are met (i.e., satisfactory commissioning results and maintenance tasks performed), the guarantee is considered to be

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SUPER ESPC BEST PRACTICES

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fulfilled. Operating hours and plug loads are often stipulated. With well-proven, predictable technologies, stipulation is often the most practical choice. The alternative is for the agency to spend money on measurements and monitoring just to check up on itself.

Weather. No one but Mother Nature controls the weather, but it can be a major factor in energy usage. A sensible approach is to normalize calculations of the baseline and yearly energy savings to a typical weather year. In mild weather years, savings will seem small, but the energy bill will also be smaller than normal and the ESCO payment manageable, with funds to spare. In extreme weather, savings will exceed expectations, and it will be easier for the agency to manage and pay all its bills than before the project.

User Participation. The behavior of building occupants is subject to only minimal control by anyone. One strategy for handling occupancy effects is to stipulate comfort settings to use in calculations and document the baseline.

Performance Factors/Responsibilities: Equipment Performance, Operations, Maintenance, Repair & Replacement

Performance of the ECMs is the foundation of the guarantee and the project's value. The ESCO is ultimately responsible for selection, application design, installation, and performance of the equipment, and must maintain specified standards of service (temperature, humidity, lighting levels, etc.). To be negotiated and spelled out in the contract are:

- 1) whether the ESCO will carry this responsibility just through project acceptance by the agency, for a limited period to prove performance and standards of service, or for the entire term of the contract;
- 2) how performance and standards of service will be verified; and
- 3) what the consequences for unacceptable performance and standards of service will be.

Responsibility for operations and maintenance and equipment repair and replacement is negotiable and may be assumed by

the ESCO, agency staff, or subcontractors. In any case, it is critical to spell out how proper performance of these functions will be ensured. Typically the agency operates the equipment with ESCO oversight. Maintenance can go either way, but the ESCO is always responsible for defining the maintenance program and verifying execution. Generally the ESCO is responsible for repair and replacement through extended equipment warranties. However, individual agencies should negotiate whatever arrangement best addresses their needs. Some choose to keep all of these functions in-house to minimize the cost of the project; others lack the in-house capability or prefer to pay more for the "insurance" of having one responsible party for all these functions.

Financial Considerations

Interest rates. No one has any control over interest rates, and timing may have the largest impact on the available interest rate and project cost.

Energy prices. Energy prices, along with usage, determine the dollar value of the energy-cost savings guaranteed by the ESCO. Agencies and ESCOs generally opt for simple and practical ways to calculate savings. A common practice is to use current energy prices for the first year of the contract and apply the energy price escalators published by DOE's Energy Information Administration for succeeding years. (See www.eren.doe.gov/femp/techassist/pdf/ashb01.pdf)

Construction costs. The ESCO can control construction costs and generally guarantees a firm, fixed price for the project, typically taking bids and locking in subcontractor prices before submitting the final proposal. Contract and price modifications are rare in Super ESPC projects. The parties must define design standards, the design approval process (including changes), and how costs will be reviewed.

Measurement and Verification (M&V) costs. In considering the wide range of M&V options and costs, the key questions are: (1) How much do I want to spend? (2) What

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SUPER ESPC BEST PRACTICES
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degree of accuracy do I need? and (3) What are the tradeoffs? Some agencies want more detailed data to verify savings to a very high degree of confidence and are willing to pay the price. Those intent on getting as many improvements as possible (to generate more savings) can take a practical, but less elaborate, less expensive approach. Super ESPC first-year M&V costs (which generally drop in succeeding years) have averaged 3.4 percent of annual guaranteed cost savings, with half of these projects keeping costs below 2.5 percent.

Delays. Both the ESCO and the agency can cause delays that have financial consequences, and the party that causes the delay should probably have to pay for it. Delays can be especially serious during construction, when the ESCO must meet the milestones of a very specific schedule to draw down construction funds.

Major changes in facility. The agency (or Congress) controls major changes in facility use, including closure. Even if a facility were closed during the Super ESPC term, the Government's financial obligations would be only the usual ones associated with closing the facility. To keep financiers comfortable (and interest rates as low as possible), the contract should include pre-negotiated terms for retirement of debt upon termination for convenience.

The responsibility matrix is a convenient, useful format for agencies to use to study and understand all aspects of the Super ESPC deal. Using the matrix to consider the options and balance corresponding costs and benefits will help agencies build best-value energy projects and meet Federal energy goals.

This article is based on a longer document that can be downloaded from the FEMP web site at www.eren.doe.gov/femp/financing/esp/implementing.html. For more information please contact Tatiana Strajnic of FEMP at 202-586-9230 or tatiana.strajnic@ee.doe.gov.

Your Alternative Financing Questions Answered

I am an ESCO that wants to use third party financing for ESPC projects and would like to know how an ESPC project interest rate is estimated.

The project interest rate is an important part of your project's price. It is based on the financing index rate. The index rate depends on the financier and is based on the term of the financing period. The IDIQ (indefinite delivery, indefinite quantity contract) allows the ESCO and financier to identify the financial index appropriate for the projects. Please go to www.federalreserve.gov/releases/h15/Current/ for pertinent market interest rates.

Why do utilities do all the conservation work through subcontractors? Isn't our justification for sole-sourcing the work with the utility based on their expertise in the energy field?

The justification for a sole-source award to a serving utility is based on a statutory exception to requirements for competition based on the Energy Policy Act of 1992. The utilities should use contractors (often competitively-selected) that will perform the work for the best value. For more information on utility energy service contracts (UESC), please see UESC: Enabling Documents at www.eren.doe.gov/femp/utility/utlmemos.html.

What questions do you need answering? FEMP wants to provide the most useful information possible, but we need your help to achieve this! Please submit your questions via e-mail to Tatiana Strajnic of FEMP at tatiana.strajnic@ee.doe.gov.

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If you are making projects happen at your Federal facility, FEMP would like to hear from you. Please submit project descriptions to Annie Haskins at the address listed below. You will be contacted for additional information if your project is selected to be featured in a future edition of the *FEMP Focus*.

Address mail to:

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